JPEG2000 Parsing/Repackaging Examples

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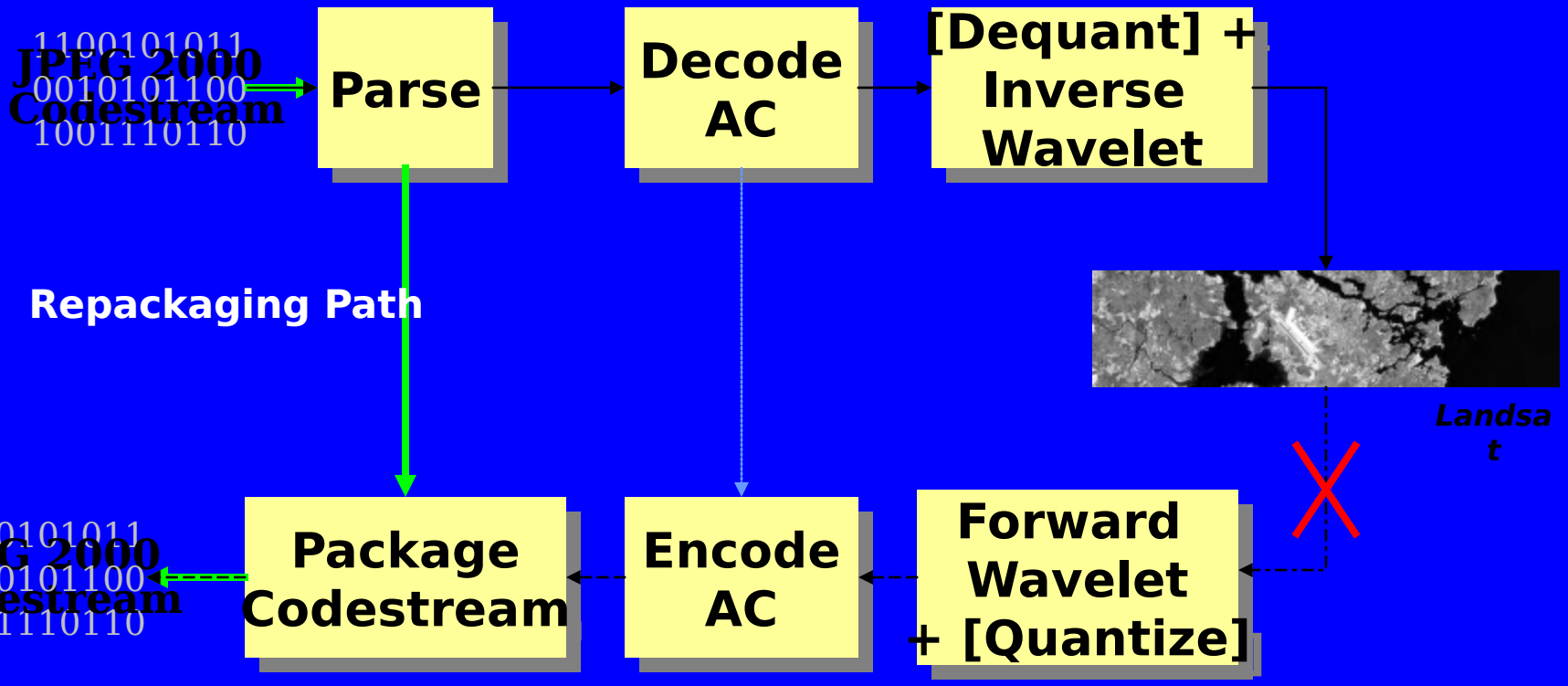
Overview

- Impact of NSGI preferred format on parsing / repackaging implementations
- Processes examined
  - Spatial restriction
  - Rate control
  - Resolution reduction
  - Releasability
  - Component restriction
  - Layer restriction
  - Partial tile expansion via codeblock parsing
- J2K codestreams tested without NITF file format

Parsing and Repackaging
(Life after Compression)



Expand = Parse + Decompress
Repackage = Parse + Package

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NSGI Parsing

Standard J2K convention

- **Tile parsing**
- **Layer parsing**
- **Resolution parsing**
- **Component parsing**

- **Codeblock parsing**
  - **for partial region expand**

Non-standard

- **Rate control**

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NSGI Repackaging

Standard J2K convention

- Tile parsing / renumbering
- Layer parsing
- Resolution parsing
- Component parsing

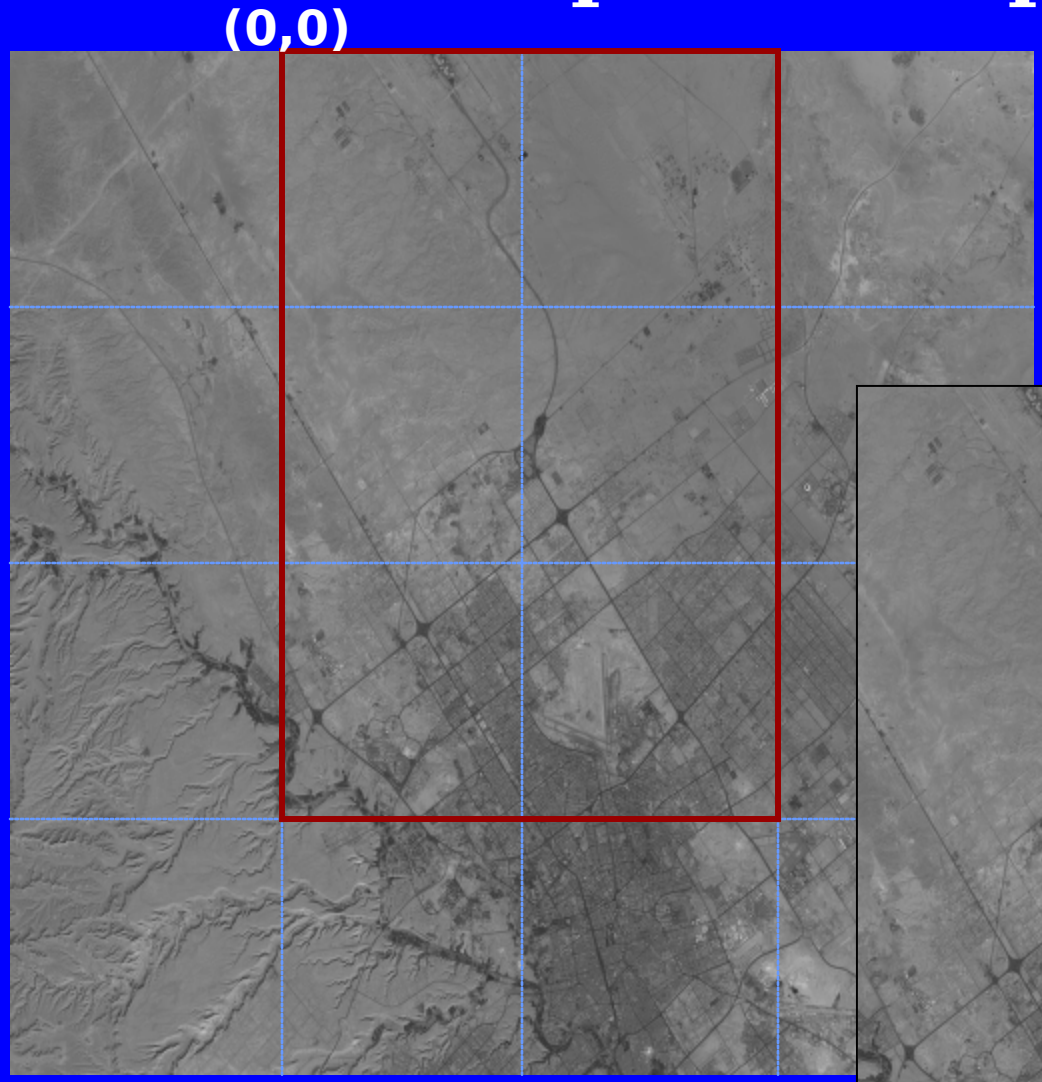
- COD modification
- QCD modification
- SIZ modification for resolution

Non-standard

- SIZ modification for chipping
  - Image/Tile offset = 0
    - *(if tile correctly sized)*
- Rate control

- Graying Out tile
- TLM inclusion
- PLT inclusion
- PLT formatting by layer

Spatial Chipping



1100101011
0010101100
1001110110
JPEG 2000 Codestream

1100101011
0010101100
1001110110
JPEG 2000 Codestream

CNES / SPOT Image

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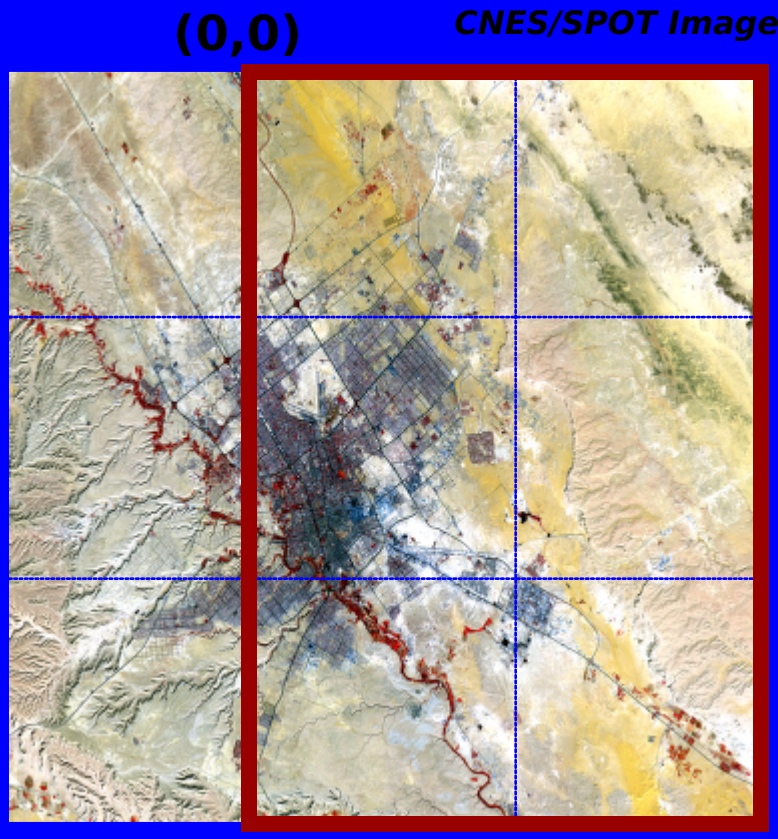
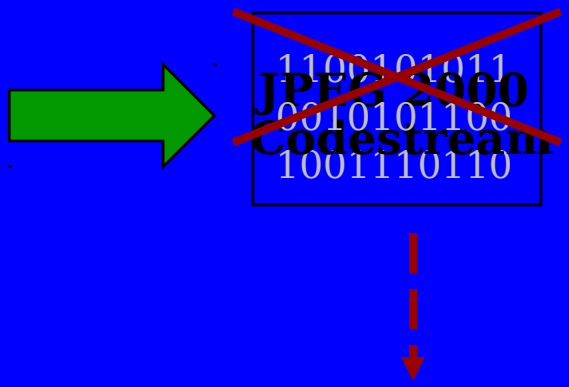
TileSize Impact on SIZ Update in Chipping





Error: Illegal inclusion tag tree

Image Size = 3000 x 3000

Tile = 1000 x 1000

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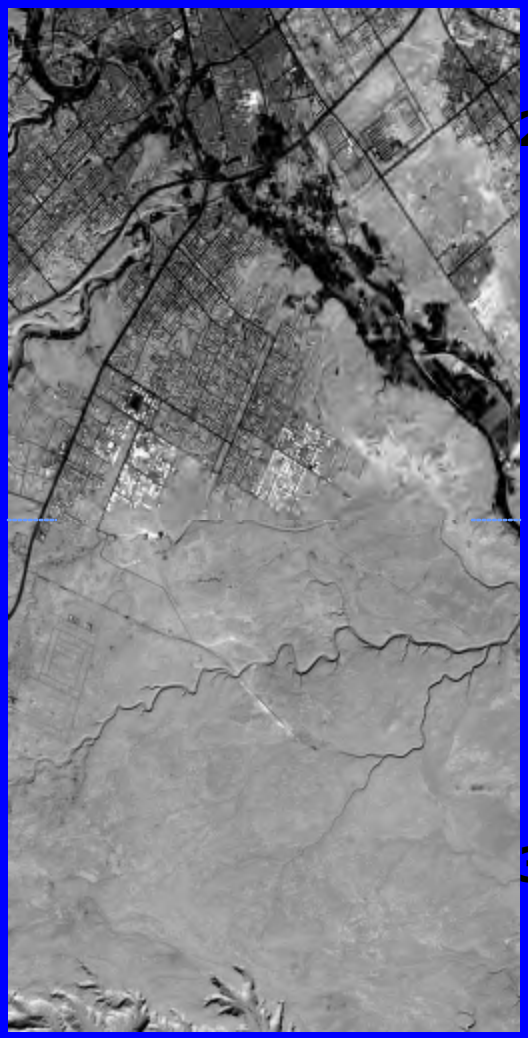
Rate Control: per Tile

1.5 bpp



2.x layers

<1 packet

1 packet

(3.9 bpp at R5)

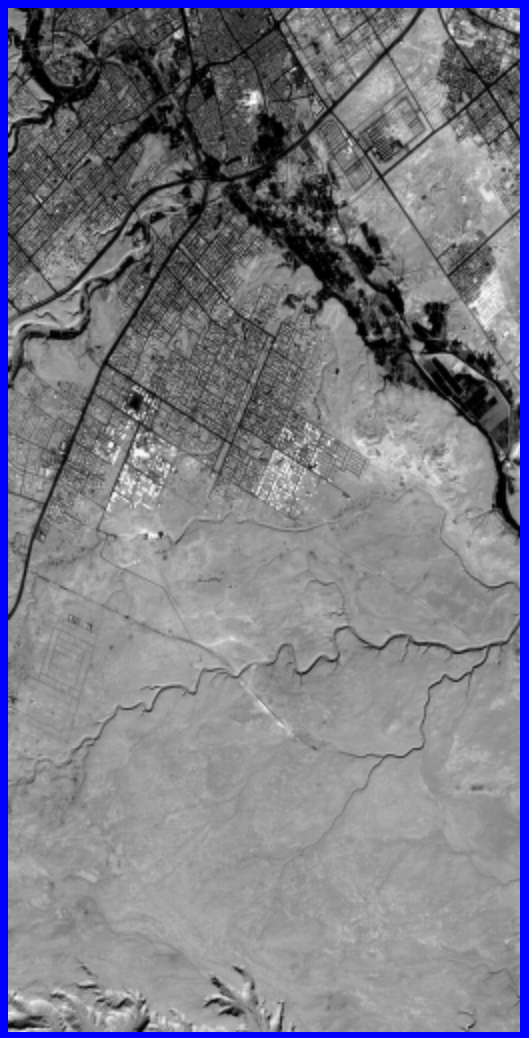
Always include
at least one packet!

3.x layers

CNES/SPOT Image

4 Layers total

R2



CNES/SPOT Image

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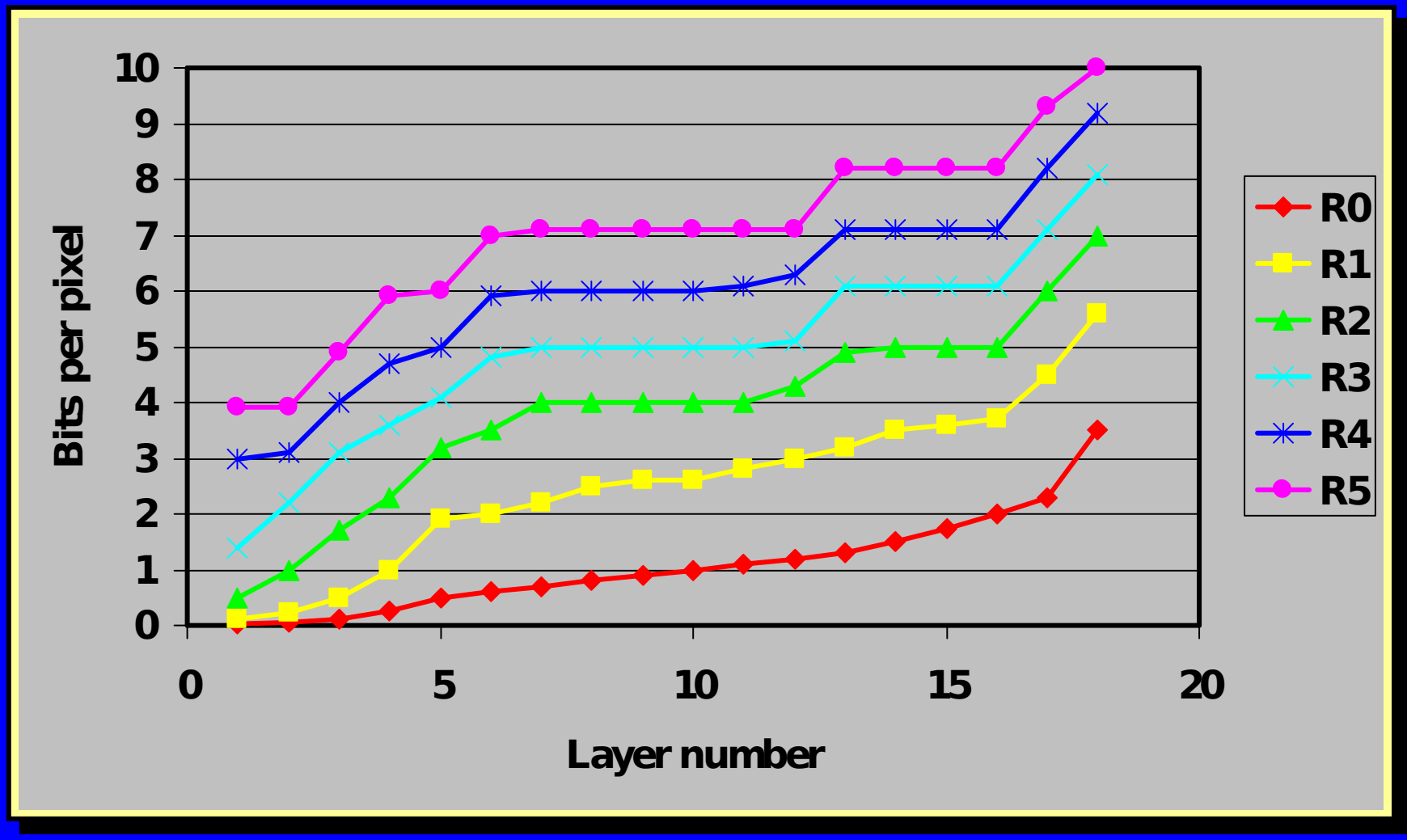
BitRate vs Resolution (varies by tile for R1-R5)



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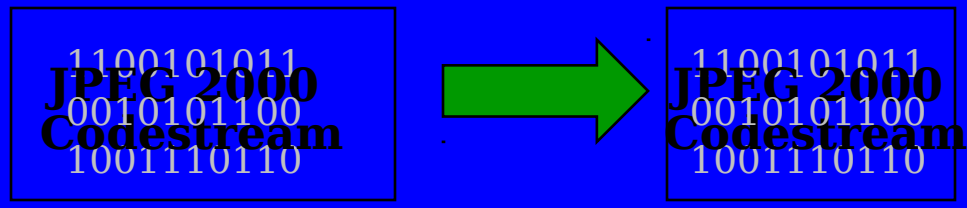
Quality Reduction

- R0 to bitrate
  - with J2K TRE — No rate control; use layer mapping
  - w/o J2K TRE — Rate control
- R1 - R5 to bitrate
  - Rate control
- Basic rules
  - replace rate control by layer parsing whenever possible
  - at least one packet must remain in every tile
  - don’t include more than 4.3 bpps [Or possibly lower]

Releasability

Space Imaging

Find non-releasable tiles



Remove all packets in chosen tiles

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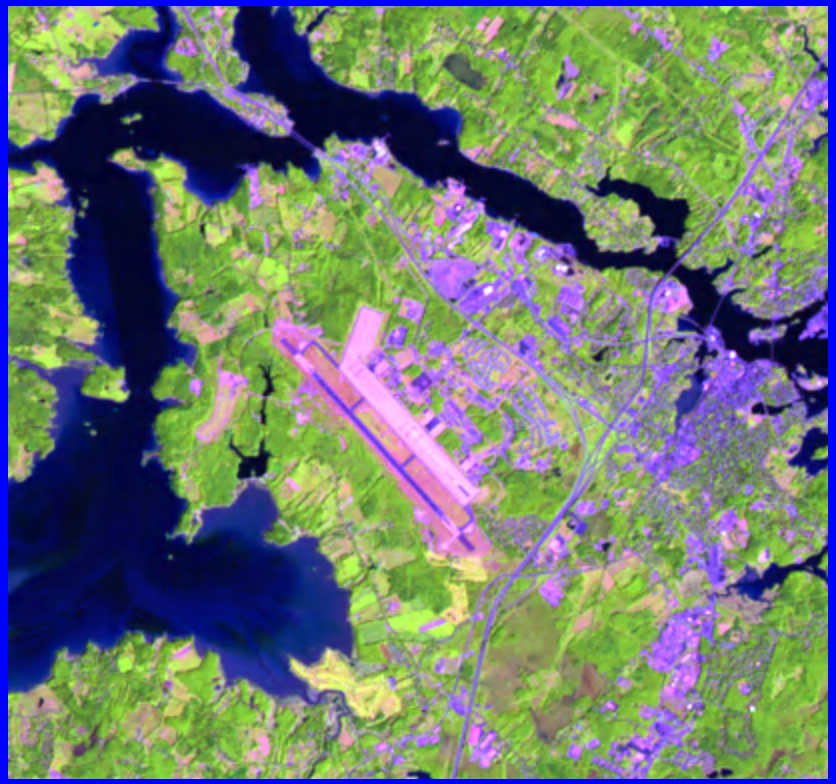
Component Selection



Landsat TM

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Layer Parsing

CNES/SPOT Image

Bpp:	0.125	→	0.25	→	0.5	→	1.0
Layers:	3		4		5		10

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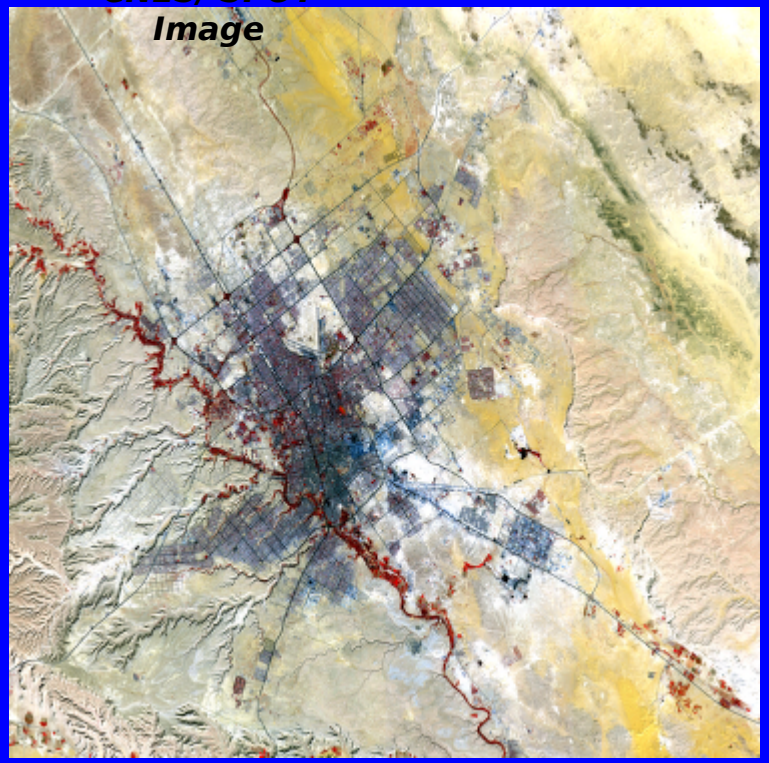
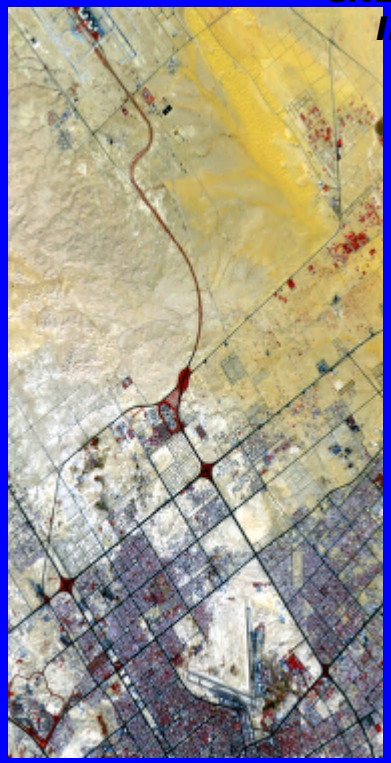
Varying Resolution / Spatial Extent via Codeblock Parsing

CNES/ SPOT Image



R3
9 full tiles



R2
4 partial tiles

CNES/ SPOT Image

R0
1 partial tile

Decode faster than full tiles

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Areas not yet Examined

- Chipping at non-tile boundaries
  - Image offsets > 0
  - Recompression at borders
- Error resilience
  - Format recommendations
- Very low bandwidth
  - Recommendations re TLM / PLT
- …